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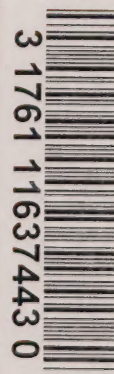
# AN ENERGY STRATEGY FOR CANADA (Summary)


## Policies for Self-Reliance



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ENERGY POLICY SECTOR

# AN ENERGY STRATEGY FOR CANADA: POLICIES FOR SELF-RELIANCE

## *Summary*



Issued under the authority of  
The MINISTER of ENERGY, MINES and RESOURCES  
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# I. Introduction

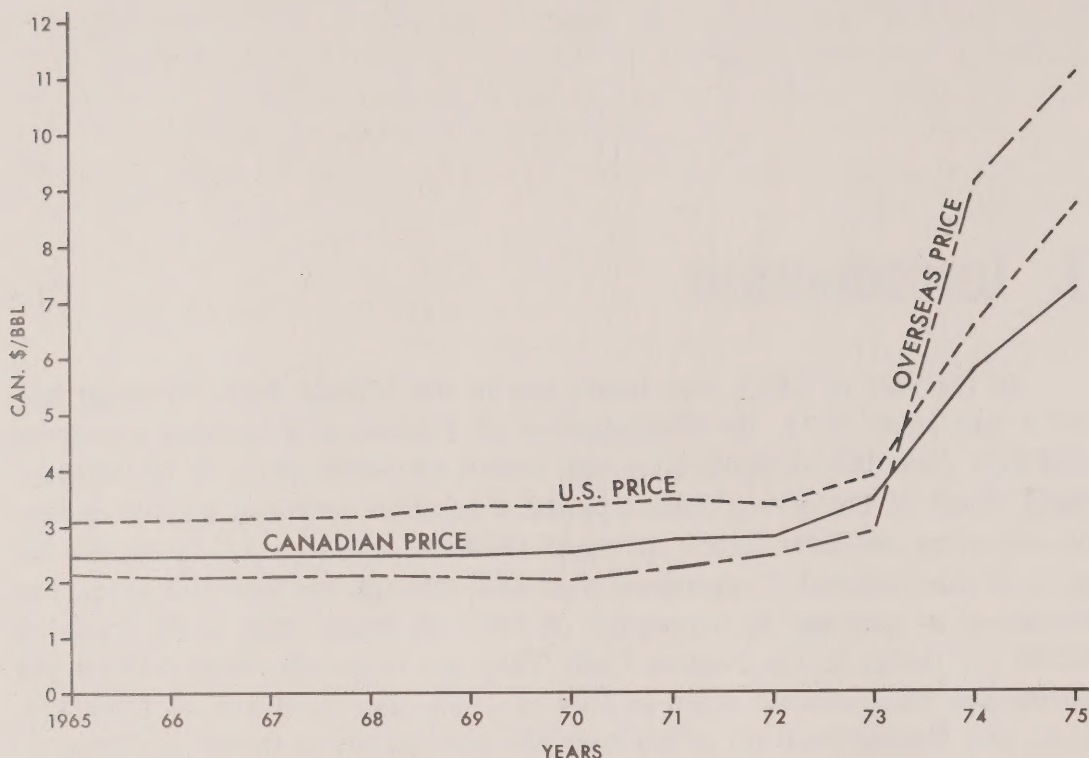
In October of 1973, war broke out in the Middle East. Through late 1973 and early 1974, the Organization of Petroleum Exporting Countries (OPEC) curtailed oil production and raised the world price of oil substantially. Some of the oil exporters applied a selective embargo against certain oil-importing countries. In the spring of 1974 this embargo was lifted, but the price of international oil remained high and, through the past two years, has continued to increase. In September of 1973 oil prices were in the range of \$2.20 per barrel in the Persian Gulf. They are currently about \$11.50 per barrel and may increase again in July of 1976. The evolution of Canadian, U.S., and international oil prices over the past decade is shown in Figure 1.

Oil makes up about 45% of total world energy consumption. For the past two years all nations have been going through a period of adjustment to higher oil prices and to the resultant economic pressures. This process of adjustment is continuing. It is complicated by substantial uncertainty about the future of the international oil market, the high costs of alternative energy supplies, and the long and variable lead times required before energy policy decisions have an impact on energy supplies or demands.

The Department of Energy, Mines and Resources has been assessing the changing situation as it relates to Canadian energy prospects. This publication presents the current results of this continuing assessment. It examines, using a "scenario" approach, some alternative energy futures that Canadians may face over the next fifteen years. It discusses a number of the problems that these scenarios imply and presents a National Energy Strategy for Self-Reliance that is directed at resolving these problems in an appropriate and effective manner.

The focus of the paper, to a large degree, is on oil and natural gas which currently make up about 65% of total Canadian energy consumption and will continue to be the single most important energy source for the next ten to fifteen years. Alternative sources of energy, such as coal and nuclear power have considerable potential to reduce this dominance, although the rate at which such substitutions can occur will depend on a number of factors, including provincial decisions with regard to coal development and nuclear

**Figure 1. Price at source of Canadian, United States and overseas crude oils, 1965-1975.**



NOTE: The Canadian price is the average value at the wellhead for domestically produced oil. The price for overseas oil is the average f.o.b. port-of-loading price for all crude oils imported to Canada (Source: Statistics Canada, *Trade of Canada*). The U.S. price is taken from American Petroleum Institute's, *Basic Petroleum Data Book*, 1975, Section VI, Table 1, and adjusted for exchange rate differences.

expansion. Current projections suggest, for example, that nuclear capacity could increase from 4.5% of total electrical generating capacity in 1975 to between 13% and 16% of total capacity by 1985. Ten years from now, nuclear power could supply between 5% and 6% of total primary energy requirements, compared with less than 1.5% in 1975. Even so, the demand and supply projections that are presented indicate that, by 1985, Canada may rely on *net* oil imports to the extent of 950 000 to 1.2 million barrels per day, or between 40% and 47% of anticipated oil demand in that year. As Canadian net imports increase, Canadian reliance on sources of supply that may be insecure will increase as well. This prospect carries with it risks—both economic and non-economic—that the Government of Canada views with concern.

The national energy strategy that the federal government has adopted is directed at minimizing these risks by minimizing the extent to which Canadians rely on imported oil. The objective of the strategy is energy self-

reliance. Self-reliance means reducing the vulnerability of Canadians to arbitrary changes in price or prolonged curtailments in supply. It means supplying Canadian energy requirements from domestic resources to the greatest extent practicable and taking all appropriate actions to protect Canadians against interruptions in the supply of energy we continue to import. It is *not* a strategy of self-sufficiency at any price, but recognizes that the policies to be adopted have costs as well as benefits and a balance that takes into account the economic, social and environmental aspirations of Canadians must be maintained.

In support of the self-reliance objective, the Government of Canada has identified nine major policy elements and has adopted a number of specific energy-related targets. The policy elements are:

- appropriate energy pricing;
- energy conservation;
- increased exploration and development;
- increased resource information;
- interfuel substitution;
- new delivery systems;
- emergency preparedness;
- increased research and development; and
- greater Canadian content and participation.

The major energy-related targets adopted by the Government of Canada are:

- to move domestic oil prices towards international levels; and to move domestic prices for natural gas to an appropriate competitive relationship with oil over the next 2-4 years;
- to reduce the average rate of growth of energy use in Canada, over the next ten years, to less than 3.5% per year;
- to reduce Canadian net dependence on imported oil in 1985 to one third of our total oil demands;
- to maintain self-reliance in natural gas until such time as northern resources can be brought to market under acceptable conditions;
- to double, at a minimum, exploration and development in the frontier areas of Canada over the next three years, under acceptable social and environmental conditions.

This strategy has been designed to deal with the problems we will be facing over the next ten to fifteen years. It is nevertheless necessary to look to the time when oil and natural gas will no longer supply most of Canada's energy. Building on the scenarios presented here, these longer-term issues will be addressed in a subsequent paper that will examine alternative energy futures beyond 1990.

## II. Canadian Energy Policies— the Past Two Years

To understand the nature of the problems we may face and the manner in which the federal government will address these problems, it is necessary to appreciate the dramatic nature of the events that have occurred in the past two years. The sudden and substantial increases in world oil prices occurred against a background of continuous growth in the world economy and in the use of energy, and oil in particular. Some historical information on Canadian energy production and use is provided in Annex III of the report. From 1963-73, energy use in Canada increased at an average rate of 5.5%. The use of oil increased at roughly the same rate as total energy and, in 1973, accounted for over 47% of total energy used. For the world as a whole, the use of oil increased by 7.7% per year over the same period, as the price of oil, and of energy generally, declined in relation to the prices of other goods and services.

### **International Developments**

The massive and rapid increases in world oil prices that have occurred since late 1973 have posed serious problems of adjustment, for the international economic system and for individual countries. They have led to a heightened awareness of the interdependence of all nations and have resulted in a number of positive initiatives by the major industrial nations, both collectively and individually. The Government of Canada has cooperated actively in multilateral efforts to ease the problems of international economic adjustment and to promote stable and equitable conditions in the international oil market. New and innovative ideas have been proposed, discussed and acted upon—in the International Monetary Fund, the Organization for Economic Co-operation and Development, the International Energy Agency and, most recently, within the framework of the Conference on International Economic Co-operation.

The International Energy Agency is a new organization which has been established to promote multilateral cooperation with respect to energy. Canada and seventeen other participating countries have concluded, within the

Agency, international agreements designed to assure the equitable sharing of international oil supplies in the event of future supply curtailments and to facilitate cooperative efforts in energy conservation, research and development, and the production of additional energy supplies. A formal dialogue among industrialized countries, oil-exporting countries and other developing countries—dealing with issues relating to energy, raw materials including food, development, and finance—was formally initiated in December of 1975 in the form of the Conference on International Economic Co-operation. Twenty-seven nations are participating in this dialogue and Canada has been designated as co-chairman of the Conference.

The last two years have also seen developments in Canada's bilateral relations with the U.S. in the field of energy. The United States has been the traditional market for Canadian exports of oil and natural gas. As well, Canada imports substantial quantities of coal from the United States and a two-way trade in electrical power is increasing in importance. No new licences to export natural gas have been granted since 1970 and, because of declining Canadian oil reserves, the Government of Canada has taken a decision to gradually phase out oil exports to the United States. Canadian supplies of oil and natural gas amount to a very small proportion of total consumption in the United States, but they do constitute an important source of supply for particular regions. The federal government is aware of the difficulties that the decision to reduce allowable oil exports creates for these regions, and consultations with the Government of the United States have been held in an attempt to minimize the impact of reduced oil exports on U.S. consumers. These discussions have led to an agreement in principle by both governments to "swapping" arrangements, whereby the efficient use of existing transportation, refining and distribution facilities could be maintained, while the security requirements of both countries would be protected.

In general, while the Government of Canada has rejected the concept of a continental energy policy, constructive discussion with the Government of the United States to determine where cooperation is to the advantage of both countries will continue to be a feature of our bilateral energy relations. One positive result of such discussions is the recent negotiation of a pipeline treaty, subject to ratification by the two governments, which would guarantee non-interference with shipments and non-discrimination in related transportation charges.

## **Domestic Energy Policies**

The domestic policy actions of the federal government over the past two years have been taken to protect Canadians from the economic distortions visited on the rest of the world by the rapid increase in oil prices while, at

the same time, in the light of declining proved oil reserves in Canada, to maintain and enhance the opportunities for Canadian self-reliance in energy. These principles have been given expression in a number of government policies and programs. The transition from low-cost to higher-cost energy has been eased by federal-provincial agreement on new pricing policies for Canadian oil and natural gas, and a number of initiatives directed at increasing the degree of our self-reliance in energy have been undertaken.

### *Easing the problems of adjustment: oil and natural gas pricing*

When world oil prices rose in late 1973, Canada was one of the few industrialized countries that was self-sufficient in oil. The price of oil in Canada had been frozen at \$3.80/bbl since September of 1973 and the major problem facing Canadian governments early in 1974 was how to facilitate the transfer of income and wealth within the country—from oil-consuming provinces to oil-producing provinces—in such a way that the legitimate aspirations of the oil-producing provinces could be realized while minimizing the disruption to the broader social and economic well-being of all Canadians.

In January of 1974 the provincial governments agreed to a single-price oil policy in Canada, proposed by the federal government. This policy allows Canadians to purchase oil at prices considerably below international oil prices, while offsetting increases in the price of imported oil with increases in the price of Canadian oil exports. In April of 1974 the price of domestic oil was set at \$6.50 per barrel and it was increased to \$8.00 per barrel in July of 1975. For the past two years oil prices in Canada have been controlled at levels substantially below oil prices in other western industrialized countries. This has enhanced the competitive position of Canadian industries and has contributed to a healthier economic performance in Canada than in most other oil-importing countries.

The price of oil in eastern Canada is currently about \$4.60 per barrel lower than the cost of imported oil delivered to Canada. All Canadian oil consumers derive advantages from being able to purchase oil in Canada at a price below international levels. During 1975 this advantage averaged almost \$5 per barrel for every barrel of oil consumed in Canada, or roughly \$3 billion. The subsidy paid directly to cushion Canadian consumers of imported oil, in eastern Ontario, Quebec and the Atlantic Provinces, was about \$1.4 billion in 1975.

Canada is no longer self-sufficient in oil. Taking account of exports of oil products, we were roughly in balance in 1975, although net imports of crude oil averaged about 137 000 barrels per day. It appears likely that our net dependence on imported oil will continue to grow for some time. Oil prices in Canada will have to continue to rise towards international levels, in view

of the desire of producing provinces for larger returns from a depleting asset, the high and rapidly increasing cost of finding, developing and transporting new Canadian supplies, and the need to encourage efficient use of this non-renewable resource.

The increases in domestic oil prices have accentuated the relative undervaluation of domestic natural gas. The National Energy Board has warned of prospective natural gas shortages and, in order to encourage the development of new supplies and ensure the efficient use of this premium fuel, the Government of Canada has announced its intention to see natural gas prices move to an appropriate competitive position relative to oil prices within the next two to four years.

The position of the Government of Canada with regard to oil and natural gas pricing has been based consistently on three principles:

- the commitment to a single-price policy for crude oil in Canada, subject to transportation differences;
- the commitment to remove the undervaluation of natural gas in both domestic and export markets; and
- the intention to use our resources to phase in price increases for oil and gas in a manner that affords an opportunity for Canadian consumers to adjust to higher prices.

In the process of translating these principles into specific policies, it is necessary to consider the overall economic prospects for Canada in the short term, as well as the respective positions of both producing and consuming provinces. In addition, decisions must adequately reflect the continuously evolving energy situation, both in Canada and abroad. We have the ability to manage the transition to higher-cost energy systems in an orderly fashion because we have domestic oil reserves which can cushion us from the shocks similar to those that have been imposed on other countries. However, this ability is diminishing as these reserves are depleting. What is necessary, in deciding further price increases, is to determine an appropriate balance between the short-term costs and the longer-run benefits to Canadians.

### *Increasing self-reliance*

In addition to developing new oil and gas pricing systems to ease the adjustment to higher-cost energy for Canadians, the federal government has taken a number of energy policy initiatives directed at increasing self-reliance in energy. Because Canada has favourable geological conditions for the occurrence of energy resources, there are more options available to us than to many other countries. However, because information on the extent of the domestic resource base is incomplete, because the costs of finding resources and converting them to energy supplies are relatively high, and because there

remains substantial uncertainty with regard to future international oil prices, choices are difficult. Energy problems are complex, interacting in both direct and indirect ways with economic, social, environmental and constitutional considerations. While there are no simple answers, there are a number of clearly defined directions in which it is necessary to move. These include the provision of more accurate and more timely information with regard to the extent, distribution, and costs of our domestic energy resources; the need to develop new energy sources in Canada; the necessity to conserve energy; and the need to ensure, through the appropriate export policies and emergency preparedness, that Canadian requirements are adequately protected.

A chronological listing of specific initiatives that have been taken in the past two years by the federal government, both independently and in cooperation with provincial governments, is presented in Annex I of the report. The major policies and programs that have been introduced to enhance our self-reliance include:

- new measures to ensure the efficient use and conservation of all energy sources, and oil in particular;
- new export policies for uranium and oil, designed to increase the degree of protection for future Canadian requirements;
- expanded resource assessment programs, in cooperation with provincial governments, particularly for coal and uranium;
- increased federal financial support for interregional electrical interconnections, to facilitate the more efficient development and use of electrical power in Canada;
- increased federal financial support for nuclear generation, in particular financial assistance for the construction of the first reactor in a province;
- participation, with the Governments of Alberta and Ontario and with the private sector, in the Syncrude oil sands project;
- the establishment of a Canadian national oil company, Petro-Canada, with an equity and debt funding of \$1.5 billion;
- an increased level of funding for Panarctic Oils Limited, in which the federal government has a 45% share;
- financial participation, with the Government of Ontario, in the Polar Gas project;
- the establishment of priorities for energy research and development and increased federal funding for energy R & D;
- extension of the domestic oil pipeline system to Montreal, with federal financial guarantees and with the potential to deliver imported or eastern Canadian oil to Ontario if necessary;

- the participation, with seventeen other countries, in the emergency sharing scheme of the International Energy Agency; and
- the development of an emergency allocation program by the Energy Supplies Allocation Board, to be implemented if international oil supplies are curtailed.

### **Federal-Provincial Considerations**

It is clear that a viable national energy strategy requires consultation and constructive cooperation with and among provincial governments. Under the terms of the Canadian constitution, control over energy resources within provincial boundaries is vested in the governments of the provinces concerned. Similarly, many of the actions necessary to implement energy policies, including energy conservation programs, lie within provincial jurisdiction. The generation and distribution of electricity has traditionally been a responsibility of provincial governments, in most provinces being provided by public utilities financed under provincial guarantees.

During the past two years federal-provincial cooperation in energy matters has progressed in a number of areas, for example in the form of federal financial assistance for provincial electrical projects (both interregional electrical interconnections and nuclear generation), joint resource assessment programs, combined research and development efforts, and joint participation in specific energy development projects. There have also been areas where federal and provincial policies have been temporarily in conflict, to the detriment of Canadians generally: most notably with regard to the fiscal systems applicable to the petroleum industry in Canada and recently with regard to the long and variable price freezes on petroleum products introduced by several of the consuming provinces.

The provincial retail price freezes of the type which some provinces imposed after the July 1975 price increase for crude oil will be a source of difficulty should they occur again. At that time the Government of Canada recommended that product price increases be delayed for 45 days, because of inventory stocks purchased at lower prices. Some consuming provinces imposed longer price freezes, one of which lasted 138 days. Others imposed no additional price restraints beyond the recommended 45 days. The situation that resulted compromised the single-price oil policy, led to inequities among provinces and regions of Canada, and caused severe cash flow problems for certain companies in some provinces. Discussions between the federal government and the provinces have recently taken place in order to develop an agreed system for treating inventories that will be equitable for both the petroleum industry and for Canadian consumers.

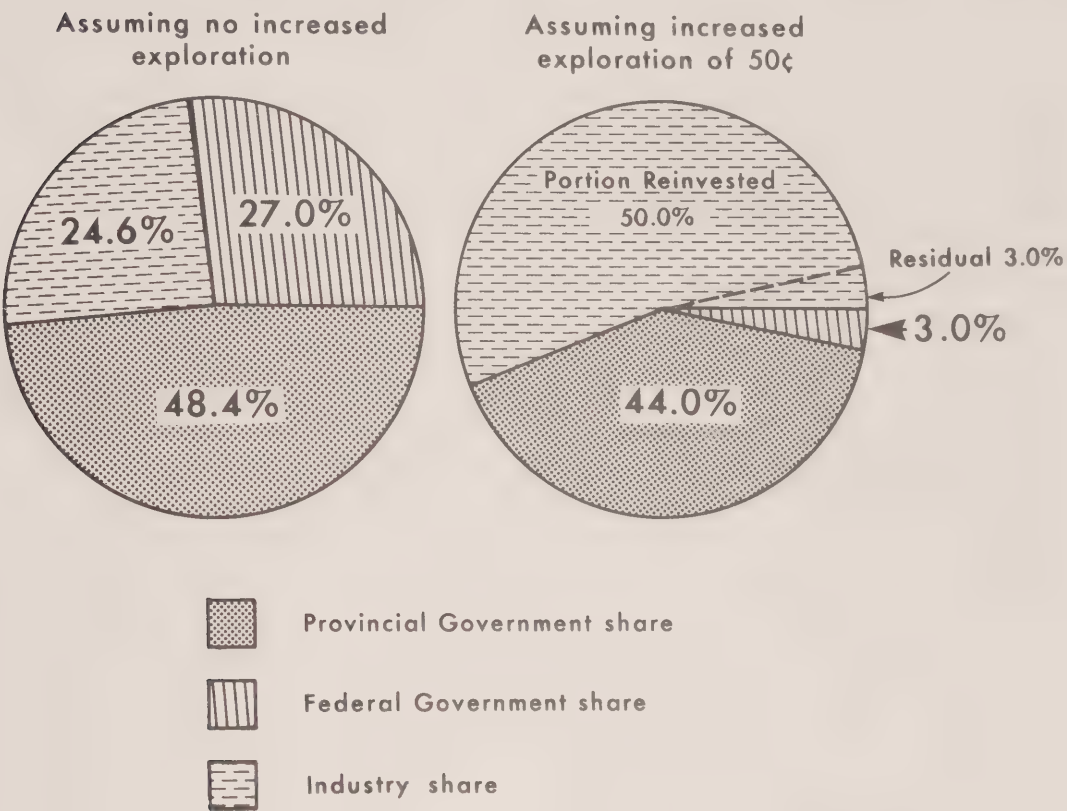
Over the past two years a number of changes have been made, by both the federal and provincial governments, in the fiscal systems governing the

operation of the petroleum industry in Canada. These changes are summarized in Annex II of the report. From the federal government's point of view the changes that it has introduced have been directed at accomplishing three objectives: first, to leave the industry with a fair rate of return on its existing investment as well as adequate cash flow to meet its financial obligations and to undertake the exploration and development that Canadians require and expect; second, to allow an appropriate return to the producing provinces in recognition of both their rights of ownership and the depleting nature of their resources; and third, to preserve a reasonable share of the resource revenues generated by a healthy and mature petroleum industry for the federal government, on behalf of all Canadians.

In retrospect, it is clear that the fiscal systems that existed in mid-1974 left the industry in an unhealthy position. In particular instances, the combined effect of federal and provincial changes led to anticipated rates of return that were too low and to inadequate cash flows. More generally, the fiscal revisions that occurred in 1974 fostered a climate of uncertainty that was not productive. Recent modifications have resulted in fiscal systems that are equitable and will, as prices rise, provide the rates of return, cash flows and incentives necessary for industry to maintain a high level of exploration activity. More specifically, over the next five years—as domestic prices are phased towards international levels—the federal government will receive about 17 % of production profits (sales revenue less operating costs), provincial governments will receive about 43% (including land and lease payments), and the industry will retain about 40%. These are average calculations based on the industry as a whole and assuming a reasonable exploration program. The shares for individual companies may vary substantially. For example, the per-barrel return (after operating costs) to a company producing oil in Alberta at the current price of \$8.00 may range from \$1.80 to more than \$4.00. The precise return will depend on such factors as the productivity of the well, whether the oil is "old" oil or "new" oil, the amount of reinvestment and certain provincial incentives.

The federal tax system is structured to encourage reinvestment. Figure 2 indicates the disposition of an additional \$1.00 per barrel in the price of domestic oil. If companies use none of this \$1.00 for reinvestment they will retain about 25¢, with the federal government collecting 27¢ and the remainder accruing to the producing provinces. However, if companies choose to reinvest, for example 50¢ of the additional dollar, they would retain about 53¢ and the federal government's share would fall to 3¢. If a company reinvested 57¢, then the federal share could fall to zero. The current fiscal system provides that the federal government and all Canadians will accept a share of the risk that accompanies the search for new oil and gas reserves. The onus is now on the industry to demonstrate that its share of revenue is being productively and efficiently used to discover and produce new energy supplies.

Figure 2. Distribution of incremental net revenues from an increase of \$1.00/bbl in crude oil.



NOTE: The shares shown for industry and the provincial governments, with re-investment, do not reflect specific provincial incentive programs (for example, drilling credits).

### III. Canadian Energy Prospects: 1976-1990

Both the manner in which energy will be supplied and the ways in which it will be used are undergoing a process of structural change that will have far-reaching implications. To provide an understanding of the nature of the problems that we may face and the relevant issues that must be addressed over the next fifteen years, two “scenarios” are presented. These scenarios deal with the evolution of future Canadian demands for energy, in relation to potentially available supplies and with reference to their implications for general economic performance. The *low-price scenario* assumes that domestic energy prices remain at their end-1975 levels in real terms (i.e. increase only with average inflation), with the exception of natural gas which is assumed to increase to “commodity-equivalent” value with crude oil in 1978. The *high-price scenario* assumes that Canadian energy prices, in constant dollars, adjust to the current international price for crude oil (\$13.00/bbl delivered to eastern Canada) by the late 1970's.

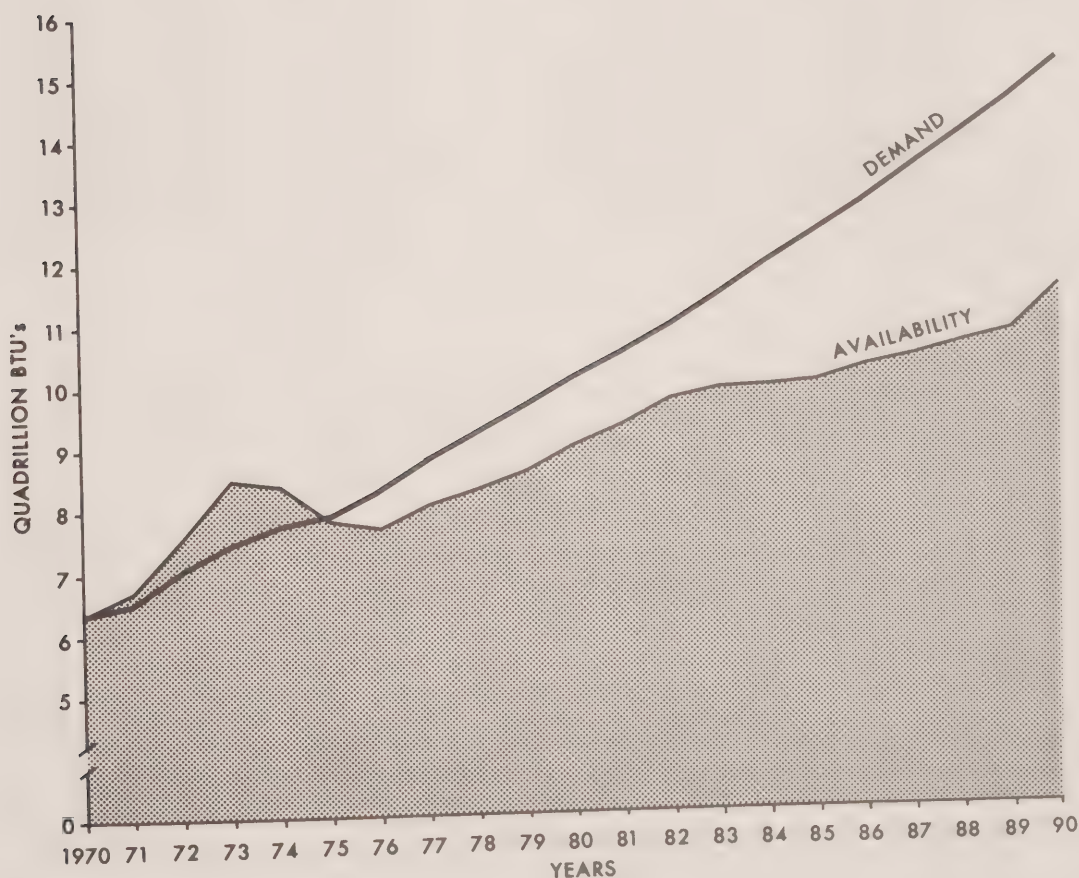
Both of these scenarios have been developed to yield projections that represent “business-as-usual” cases. For instance, they do not make explicit allowance for new conservation initiatives by governments. They indicate the nature of the problems that may arise and, in this sense, they provide a useful framework within which appropriate policies can be considered.

All projections of future events are uncertain and these are no exception. Critical areas where current uncertainties are most pronounced include the magnitude and distribution of the Canadian hydrocarbon resource base and the future costs of additional hydrocarbon supplies; the magnitude of the reduction in future Canadian energy demand growth in response to higher prices and to energy conservation programs; the development of technology affecting the production, distribution, conversion and utilization of energy; and future price levels for international oil. In view of these uncertainties the projections themselves must be regarded as indicative rather than firm. They are continuously being refined and revised as new information becomes available and a number of additional studies will be published which will explain in more detail the manner in which they have been derived and their sensitivity to key assumptions. Although the numerical forecasts may vary, however, the

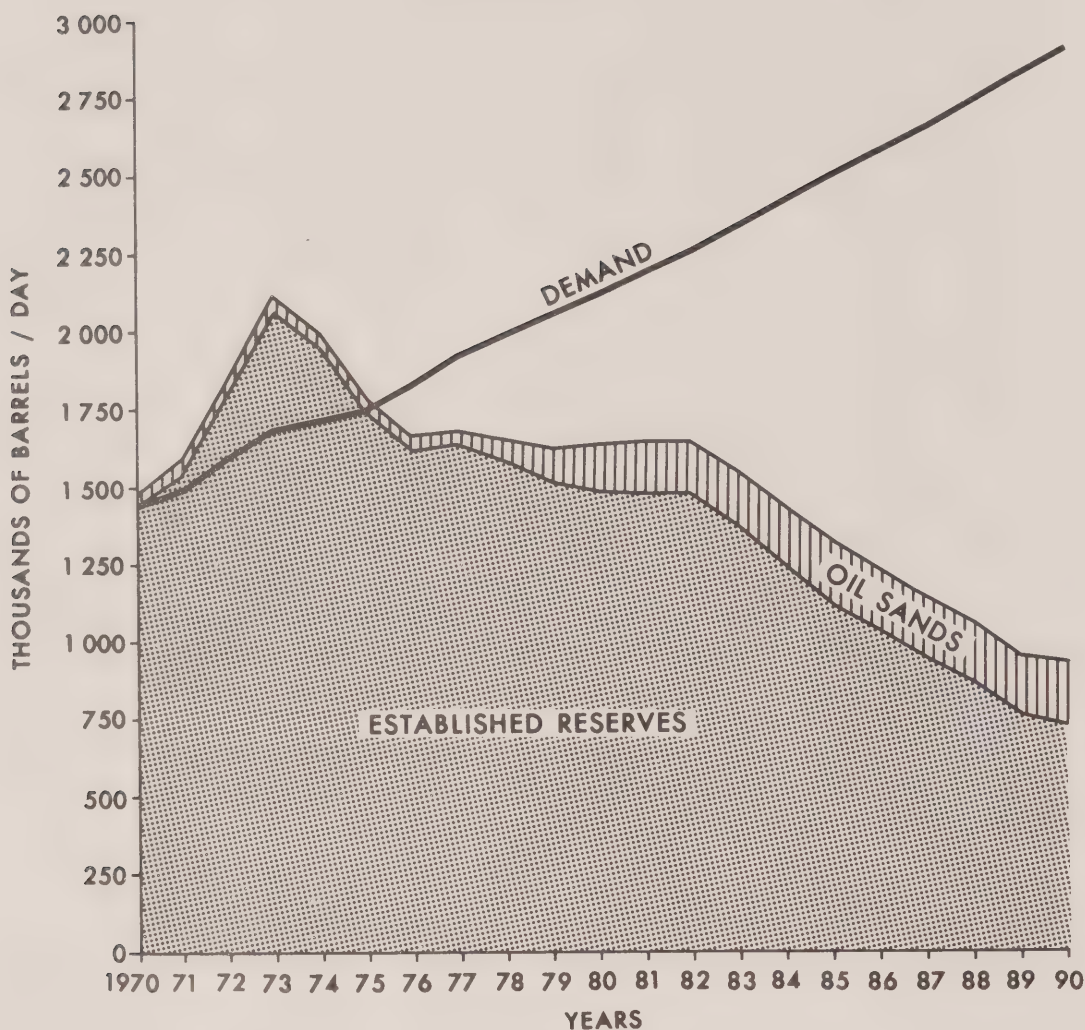
qualitative implications of the scenarios themselves can be regarded as accurate indications of the nature of the energy planning problems we are likely to experience in the next fifteen years. Some of the major developments that the scenarios indicate could occur are highlighted below.

- (i) Figures 3 and 4 indicate that, if current domestic price levels for energy advance only to keep pace with inflation (the low-price scenario), the gap between Canadian demands for energy and domestic availability would likely increase through the next fifteen years. It is estimated that energy demands would increase by about 4.5% per year (compared with a historical average of 5.5%). It is also estimated that at these prices further oil sands developments, and the production of oil and natural gas from Canada's frontier areas, would not be economically practicable. The energy "shortages" that would materialize in the low-price scenario could conceivably be met by importing energy supplies—at prices that are likely to be higher than current Canadian prices—or by rationing available domestic supplies. If we were to import oil to meet domestic oil demands, then net oil imports could amount to 1.2 million barrels/day by 1985 (47% of demand) and almost 2 million barrels/day by 1990 (68% of demand).

**Figure 3. Domestic demand and availability: total energy (1970-1990; low-price scenario).**

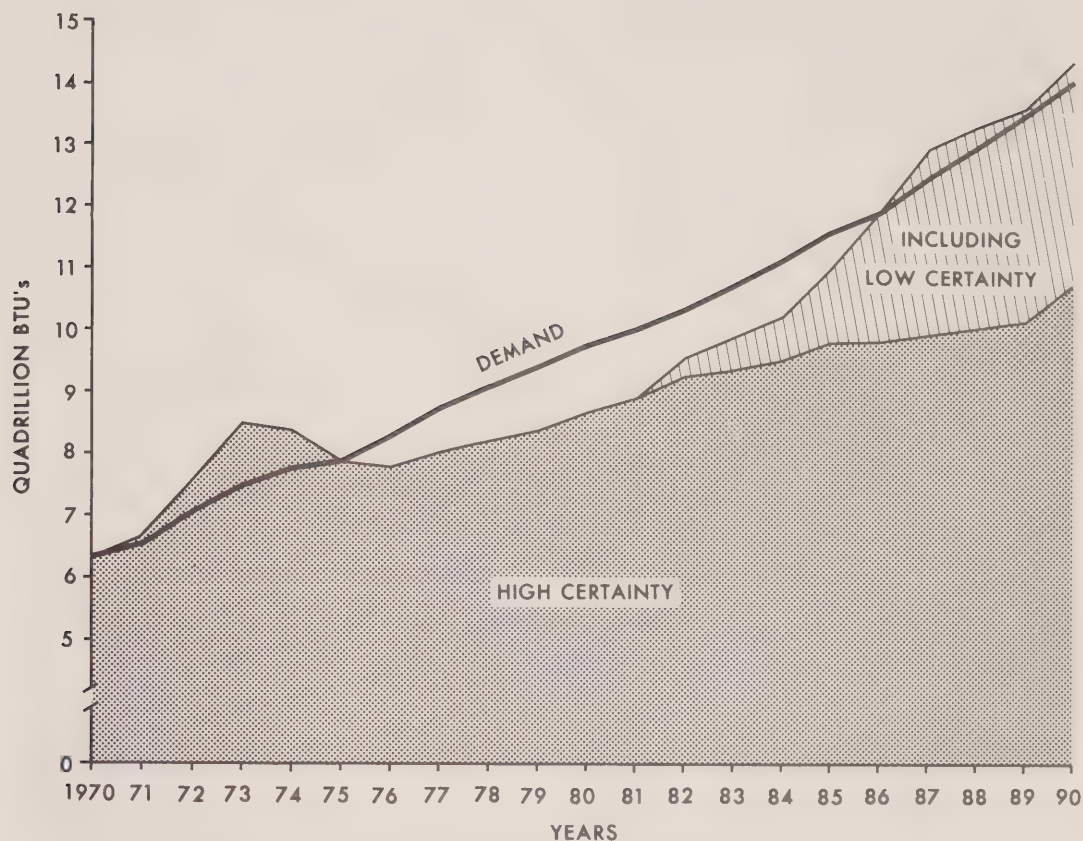


**Figure 4. Domestic demand and availability: oil (1970-1990; low-price scenario).**



- (ii) Figures 5 and 6 suggest that, if domestic energy prices were to adjust to current international oil prices, Canada might regain a position by the late 1980's where net domestic availability of energy could exceed domestic energy demands—as it did from 1970-75. Higher prices could reduce the average increase in energy demands still further, to about 4% per year. In addition, they would stimulate the production of additional resources from Canada's frontier areas. Probable dates when frontier resources could be made available must be tentative since they will depend on the results of drilling programs, on decisions not yet taken with regard to delivery systems and, most critically, on the assessment of the social, environmental and economic costs of frontier resources. In this regard the estimates of the magnitude and, more particularly, the timing of additional energy supplies from Canada's frontier regions that are estimated to become available in the high-price scenario must be regarded as highly uncertain. It should be stressed that even under the high-price scenario it is possible that Canada could remain a substantial net im-

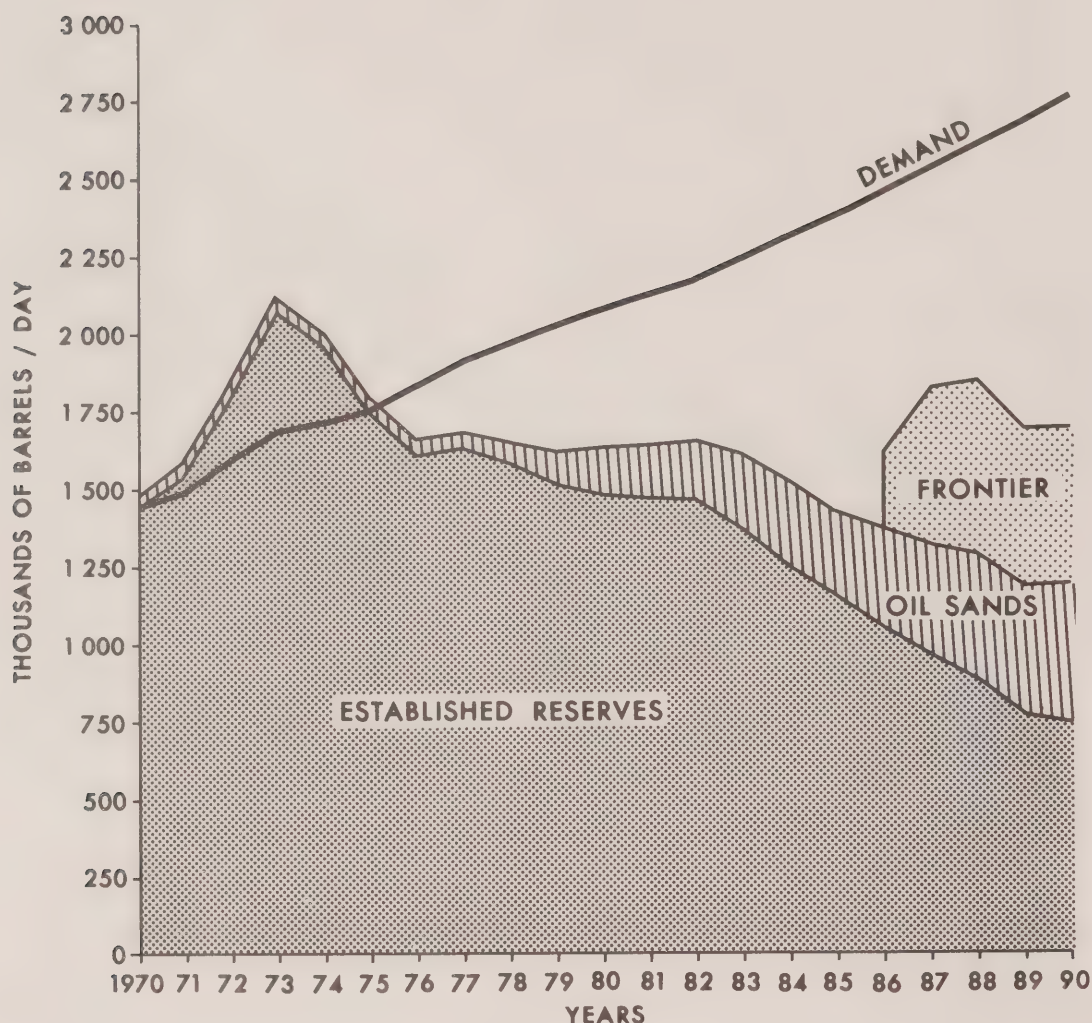
**Figure 5. Domestic demand and availability: total energy (1970-1990; high-price scenario).**



porter of oil through the 1976-90 period, relying on foreign suppliers for as much as 40% of our domestic demands in 1985 and 38% in 1990.

- (iii) With regard to natural gas, in both scenarios the gap that existed in 1974 and 1975 between domestic deliverability and total demands, including contractual export commitments, is expected to persist at least until the early to mid-1980's. Figure 7 shows projected demands and availability for the two scenarios. The deficits that are indicated through the late 1970's and early 1980's reflect, in large measure, the inability to transfer deliverable supplies from one delivery system to another. For example, while the Westcoast Transmission system is projected to experience continuing shortfalls, at least until frontier gas becomes available, it is anticipated that the TransCanada PipeLines system would be able to meet estimated requirements to about 1982 in the low-price scenario and about 1985 in the high-price scenario.
- (iv) The domestic availability of coal and electric power could exceed domestic requirements, providing some potential for substitution away from oil and natural gas towards these other energy sources. The degree to which these potential interfuel substitutions can in fact occur will be constrained by a number of factors including technological developments, relative energy prices, and the rate at which existing energy-using equipment is replaced.

Figure 6. Domestic demand and availability: oil (1970-1990; high-price scenario).



- (v) The provision of additional domestic energy supplies will be expensive, requiring in the range of \$180 billion worth of manpower and materials, purchased at 1975 prices, over the next fifteen years. The relative distribution of energy investment in the two price scenarios is indicated in Table 1. In the low-price scenario, capital requirements for electric power generation are estimated to be \$130 billion, or almost 76% of the total. Investments of this magnitude in electricity generation, transmission and distribution would amount, on average, to about 3.7% of GNP and would require increasing reliance on debt markets if electricity prices were to increase at only the average rate of inflation. Figure 8, which indicates, for the high-price scenario, the magnitude and the timing of such capital requirements relative to the Gross National Product (over 5.2% on average, compared with 3.5% over the period 1950-75), suggests that strains on markets for labour and equipment may result. In addition, these requirements may necessitate some adjustments in Canadian financial markets. Recourse to foreign capital,

Figure 7. Demand and availability: natural gas (two scenarios).

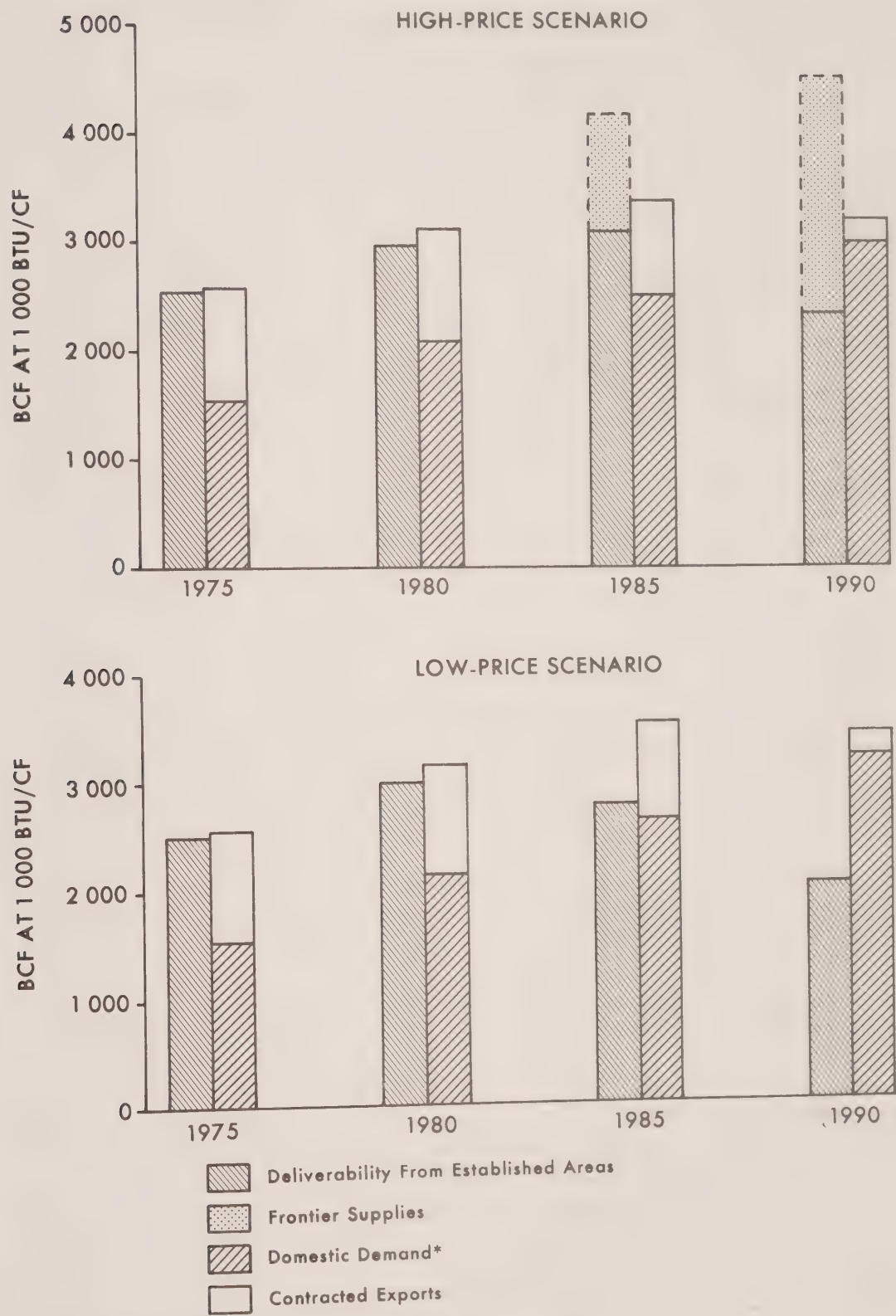


Table 1

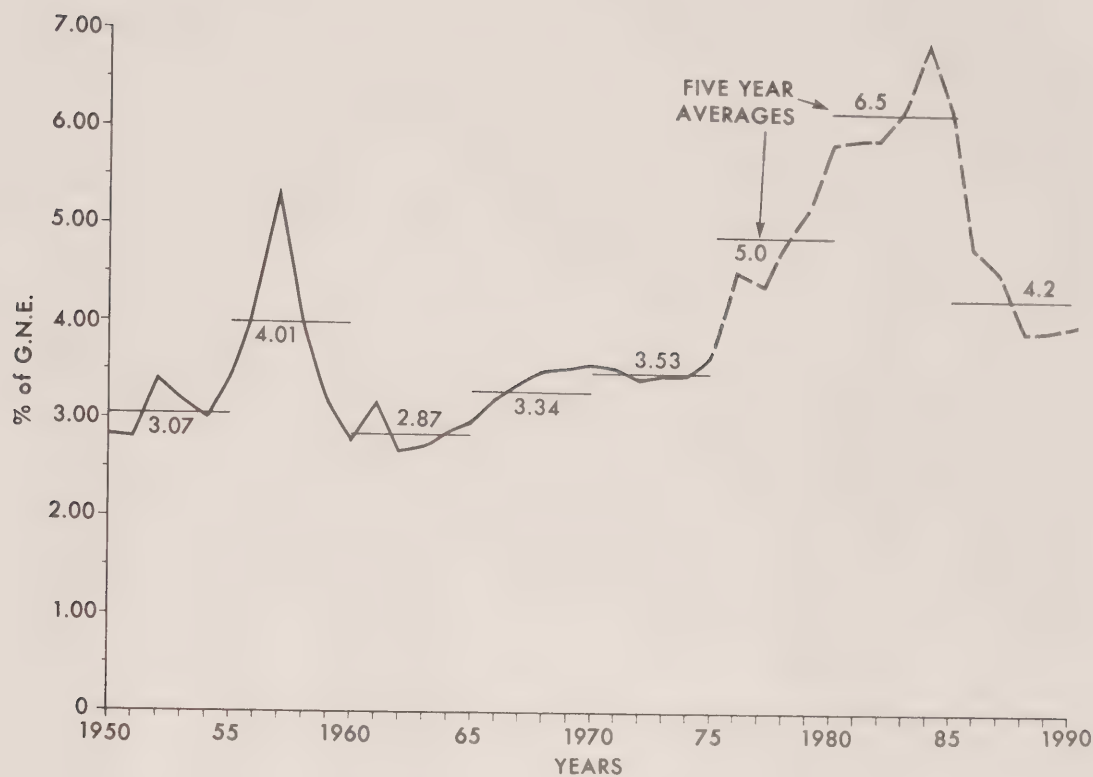
## Estimated Energy-Related Capital Requirements, 1976-1990

(High-Price Scenario, billions of 1975 dollars)				
	1976-80	1981-85	1986-90	Total
Electric power.....	21.7	32.5	37.0	91.2
Pipelines.....	5.7	19.2	3.0	27.9
Petroleum				
Exploration and development.....	10.6	15.5	14.2	40.3
Refining and marketing.....	3.9	4.1	4.8	12.8
Oil sands.....	3.0	2.3	.3	5.6
Coal*.....	.8	1.5	.9	3.2
Energy investment.....	45.7	75.1	60.2	181.0
Estimated GNP.....	912.1	1 162.0	1 438.5	3 512.6
Energy investment as % of GNP.....	5.0 %	6.5 %	4.2 %	5.2 %
(Low-Price Scenario, billions of 1975 dollars)				
	1976-80	1981-85	1986-90	Total
Electric power.....	29.2	43.0	58.4	130.6
Pipelines.....	2.5	2.6	2.8	7.9
Petroleum				
Exploration and development.....	6.3	4.8	4.0	15.1
Refining and marketing.....	3.9	4.1	4.8	12.8
Oil sands.....	1.5	.2	.1	1.8
Coal*.....	.8	1.5	.9	3.2
Energy investment.....	44.2	56.2	71.0	171.4
Estimated GNP.....	912.1	1 162.0	1 438.5	3 512.6
Energy investment as % of GNP.....	4.8 %	4.8 %	4.9 %	4.9 %

\* The estimates related to coal do not include estimates of new investment necessary to upgrade transportation systems.

while it could ease the balance-of-payments strains associated with continued oil imports, could lead to conflicts with the Canadian ownership and participation objectives of the federal government. It will be necessary for governments and industry to coordinate the planning of large investment projects so that they can be phased and completed in an appropriate manner.

- (vi) Even assuming that the world price of oil does not increase in the future, it is estimated that the balance of trade in oil could swing from a surplus of about \$1.0 billion in 1974 to a deficit of about \$4.5 billion by 1985. In the early part of this period the deterioration in oil trade will be offset by higher

**Figure 8. Total energy-related investment as a percentage of gross national expenditure, 1950-1990.**

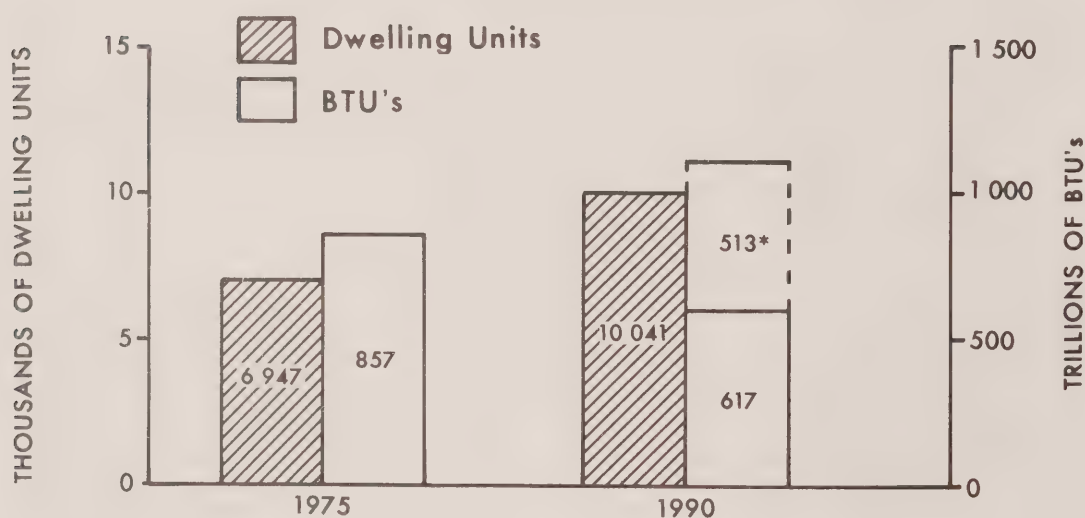
prices for natural gas exports. Through the entire period it may be partially offset by surpluses arising from trade in other energy commodities and by foreign capital inflows related to energy projects. The overall implications of swings in energy trade must be assessed in the context of the total balance-of-payments situation as it is expected to evolve.

- (vii) In addition to exacerbating Canadian supply/demand problems for energy, maintenance of current domestic oil prices could lead to substantial deficits in the Oil Import Compensation Fund, requiring the subsidization of oil consumers from general revenues. Estimates suggest that such deficits might be about \$15 million in fiscal 1976-77 and total close to \$2.3 billion over the following three fiscal years. The average rate of compensation is currently about \$4.60 per barrel, and may increase in July of 1976 if international prices rise. If domestic oil prices were to increase along with international oil prices, in a manner that reduced the average compensation to \$3.60 per barrel—the level prevailing in July of 1975—and maintained it at this level, there could still be a cumulative deficit in the Oil Import Compensation Fund of about \$350 million over the next four fiscal years.
- (viii) The necessity, in the light of our energy situation, of moving domestic oil prices towards international levels, will impose additional costs on Canadians and will have implications for the federal government's Anti-Inflation Program. Higher oil prices will lead to higher rates of inflation, although the existence of the Anti-Inflation Program can be expected to reduce the impacts

of higher oil prices on consumer prices. Inflation is a critical problem which must be resolved but it is necessary, in seeking the best ways to deal with it, not to impose solutions which will result in greater problems in the future.

The scenarios that have been developed suggest that Canada's medium-term supply/demand situation for energy poses serious potential problems, which could adversely affect domestic economic performance and Canadian living standards over the next fifteen years. At the same time, however, we have the ability to manage our future so that these problems can be substantially reduced. Energy conservation measures—which offer the most immediate results at the lowest cost and with minimal risks—must be actively pursued. The examples presented in Figures 9 and 10 indicate that, under reasonable conditions, total energy required for residential space heating and automobiles could be reduced by 1990 to amounts lower than those used in 1975. Preliminary estimates indicate that it could be feasible to reduce the growth rate in energy use to 2% per year on average, over the next 15 years, with minimal economic or social cost. An assessment of possible initiatives directed at attaining such a reduction, and their costs, is being pursued in order to determine the relative costs and benefits of specific energy conservation measures.

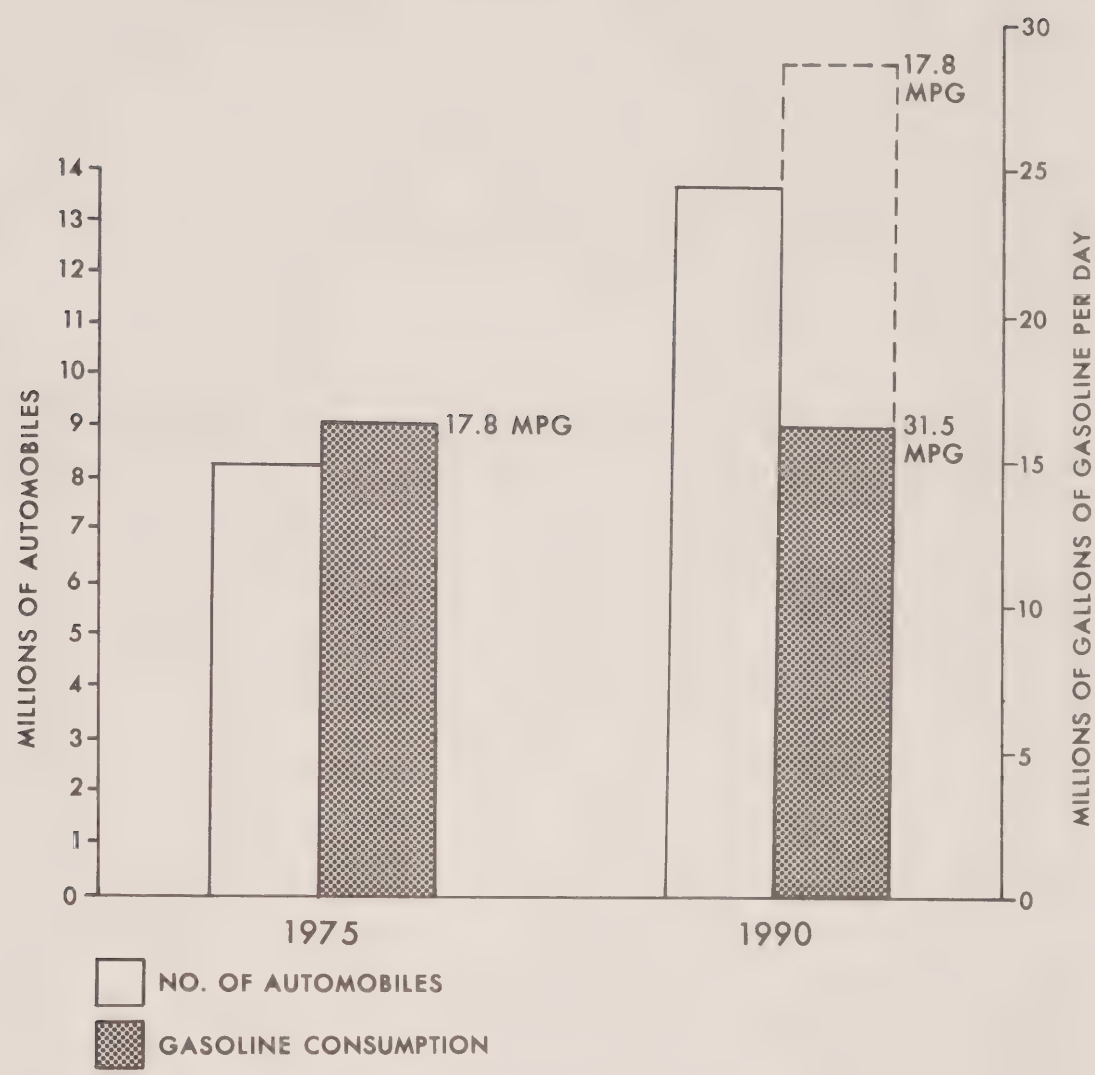
**Figure 9. Energy use for residential space heating.**



\* Savings attributable to improved furnace servicing (20%), new construction standards (31%), and retrofitting (49%).

In addition to energy conservation, substantial scope could exist for encouraging the substitution of those energy forms in relatively abundant supply in Canada (specifically coal and nuclear power and perhaps natural gas from the frontier as well) for other energy sources, particularly in eastern Canada where the dependence on oil is much greater than the national aver-

Figure 10. Motor gasoline used for automobiles.



age because of oil-based electrical systems, and where all oil is imported. The degree to which such substitutions can be facilitated will depend on the relative costs (including social and environmental costs) as well as on provincial government policies with regard to the development of coal and nuclear power.

Although it is not anticipated that renewable energy resources, apart from conventional hydroelectric power, can make a substantial contribution to total energy supplies over the next 15 years, they may be able to play an important role—particularly in small-scale and remote applications. Over the longer term it will become necessary to rely increasingly on renewable energy sources, such as solar, wind, and tidal power, and the necessary research and development must continue in order to effect a transition to such energy forms in a smooth and orderly manner.

## IV. A National Energy Strategy

Energy policy planning in Canada is paradoxically difficult because we are in the fortunate position of having a number of possible options. Unfortunately, our knowledge of the geological, technological, environmental and economic factors associated with many of the available options will only be unfolded over the course of many months, even years. In the case of reserves, and the costs of finding, developing, and bringing them to market, good luck may be just as important as good management—and perhaps more so. There is, therefore, an unavoidable lack of precision in assessing accurately the costs, the benefits and the risks attending alternative courses of action. The scenarios developed suggest that we have substantial potential to manage our energy future—including both the supply and demand aspects—in a way that minimizes risks, to the benefit of all Canadians. Such a course, or management strategy, will have to be supported by a number of energy policies. It will be expensive, will require structural adjustments to the manner in which our economic system functions, will necessitate a reordering of priorities, and will demand effective federal-provincial coordination on energy matters. Such a course is not without risks, but there is no risk-free solution for Canada. There are only degrees of risk related to particular objectives. The federal government believes the strategy outlined here will maximize our opportunities in a least-risk way.

### Objective

The overall objective of the National Energy Strategy which the Government of Canada has adopted is *energy self-reliance*.

Self-reliance in energy can be measured by the degree to which we are independent of imported oil from insecure sources. *The prospect of increased dependence on imported oil, in today's circumstances, carries with it a degree of risk—both economic and non-economic—that no Canadian, in ordering his private affairs, would accept without some form of insurance.* We do not necessarily want to eliminate oil imports. We do want to reduce our vulnerability to arbitrary changes in price or prolonged interruptions in supply.

This we can accomplish: first, by reducing our oil imports to the greatest extent possible and desirable in the context of our general economic, environmental and social objectives; second, by ensuring that we maintain a degree of emergency preparedness sufficient to withstand possible supply curtailments with minimal economic and social consequences.

Some Canadians have suggested that the objective of a national energy policy should be self-sufficiency in oil and other forms of energy. However desirable that might be, it is clearly not a realistic objective for the next ten years. Nor can we be sure that it is realizable in 15 years. The problem with self-sufficiency is that it fails to recognize a fundamental fact of life—this policy choice is not really open to us at this time for a number of technical, economic and social reasons. For instance we do not yet know whether we will discover oil in sufficient quantity, or what the costs of producing it and delivering it to market might be. All policy choices which aim at greater or lesser degrees of self-sufficiency involve costs: higher energy prices; greater investment in energy at the expense of other goods and services; and structural adjustments in our social and economic institutions in order to utilize energy more efficiently and to use different forms of energy. Some options will be more costly than others, and it may well be that the option that offers Canadians the greatest benefits—even allowing for a certain degree of risk—would involve some continued reliance on imported oil supplies. The goal of being able to satisfy our requirements for each energy source from domestic resources, particularly in the light of our oil situation, is inadequate because it fails to recognize that the costs of meeting this objective might well be too high.

Self-reliance means reducing our vulnerability. It means supplying Canadian energy requirements from domestic resources to the greatest extent practicable. It is consistent with exporting energy surplus to Canadian requirements if this should be desirable. It recognizes, however, that the policies we will adopt have costs as well as benefits and a balance that provides the maximum advantage to Canadians must be found.

#### **GENERAL TARGET**

**Given the need for Canadians to adjust to and adopt new conservation measures, given the long lead times for exploration and development, and for the provision of transmission and transportation facilities, given the enormous capital sums that must be deployed and given the need to focus this activity within a manageable time frame, the Government of Canada believes that we should set as our general target: energy self-reliance within ten years.**

### SPECIFIC TARGETS

To reduce our net dependence on imported oil in 1985 to one third of our total oil demands.

To maintain our self-reliance in natural gas until such time as northern resources can be brought to market under acceptable conditions.

## Policy Elements

In support of the objective of energy self-reliance, the federal government proposes nine major policy thrusts. These policy elements provide a coordinated framework for the development of specific programs and measures. They will be developed with appropriate federal-provincial consultation, and with due regard to social, environmental and economic objectives of Canadians.

### *1. Appropriate energy pricing*

- **Specific Target:** To move domestic oil prices towards international levels; and to move domestic prices for natural gas to an appropriate competitive relationship with oil over the next two to four years.

It is clear that the appropriate pricing of Canadian crude oil and natural gas supplies is fundamental to our objective of energy self-reliance for Canada. Domestic prices must continue to increase, to reinforce efficiency and restraint in energy use; to encourage the development of additional Canadian supplies; to reduce the magnitude of the transfer of incomes and wealth from Canadians to oil-exporting countries; and to reduce the subsidization of oil consumers by the general taxpayer. Canadian prices need not move to international levels if it is clear that new Canadian resources can be delivered to markets at prices that are lower.

In addition, the Government of Canada will ensure that exports of energy commodities are sold at international prices or commodity value in the markets to which they are delivered.

Electrical power will become increasingly important in our future energy system. In view of the large anticipated capital requirements that will be necessary to provide adequate electric system capacity some provincial utilities and provincial governments are re-examining their pricing policies and load management techniques. The federal government is prepared to encourage studies in these areas by sharing the cost of such demonstration projects as are deemed to be in the national interest.

## 2. *Energy conservation*

- **Specific Target:** To reduce the average rate of growth of energy in Canada, over the next ten years, to less than 3.5% per year.

The federal government's energy conservation program is designed to encourage efficiencies in energy use and, more generally, to reduce the rate at which Canadian energy requirements will grow in the future. It is apparent that even at current Canadian energy prices, we have reached the point where it is economically profitable for individuals and industries to make investments now to save energy in the future. As Canadian prices continue to increase, this incentive will become even greater. It is less obvious, but no less true, that as a nation we are at a point in time when it is less costly to save energy than to produce more of it. For example, recently introduced mileage standards for automobiles will result in a reduction of gasoline consumption in 1985 to levels 20 % below 1975 consumption, even after allowing for continued growth in the number of automobiles. The energy saving in 1985—compared to the amount of gasoline that would have been required if automobile efficiency remained at today's levels—would be equivalent to the annual output of two Syncrude-size oil sands plants at a capital cost in excess of \$4 billion.

Recently announced energy conservation measures include mileage standards for automobiles sold in Canada, energy-efficient guidelines for buildings, minimum energy standards for appliances, support of energy conservation through existing industrial assistance programs, and lower energy consumption by federal departments and agencies. Other approaches involve studies of conservation measures and joint efforts with provincial governments. Reducing the rate of increase in energy demands to our target of less than 3.5% per year will reduce substantially the capital requirements that will be necessary to produce new energy.

## 3. *Increased exploration and development*

- **Specific Target:** To double, at a minimum, exploration and development activity in the frontier regions of Canada over the next three years, under acceptable social and environmental conditions.

With respect to oil and natural gas it will be necessary to increase exploration activities in order to provide the information that will be required to make appropriate decisions. It is estimated that over the period 1976-80 we will require total exploration and development expenditures amounting to over \$10 billion (in 1975 dollars), with exploration accounting for about 70% of this total. Total exploration and development in 1975 is estimated to be about \$1.5 billion, of which some \$350 million was spent in the frontier areas of Canada.

It is important that a high level of activity be maintained, particularly in the frontier regions of Canada. To assure that this occurs, the Government of Canada

- has established Petro-Canada, which will be capitalized to a total of \$1.5 billion and will engage actively in frontier exploration; and
- will introduce to Parliament new legislation concerning Canadian oil and gas land regulations, which will reduce uncertainty by providing a stable fiscal and land tenure system, but which will also impose conditions aimed at the acceleration of exploration activity.

It is the federal government's view that, as domestic prices for oil and natural gas continue to increase towards the levels which will provide adequate incentive to produce frontier resources, the cash flow position of the industry will be sufficient to meet normal financial obligations and to undertake an accelerated exploration and development program. It will be necessary to monitor the use of industry cash flow. *A mandatory reporting system will be introduced and, should it become necessary, the Government of Canada will take appropriate action to ensure that a reasonable share of the industry's cash flow is used for exploration and development in Canada.*

#### 4. Increased resource information

The aim is to accelerate the flow of accurate information about the Canadian resource base, including coal, uranium, and petroleum supplies in Canada's frontier areas.

One of the most serious problems facing the federal government in its efforts to elaborate appropriate energy policies, is the substantial degree of uncertainty that remains with regard to ultimately recoverable resources in the frontier areas of Canada. In the Beaufort Sea, and in the offshore areas of the Arctic Islands and eastern Canada, large geological structures which may contain substantial reserves of hydrocarbons have been identified. It is difficult to plan efficiently without knowing whether these structures are full or empty, and this knowledge can be obtained only by drilling. The federal tax system provides substantial incentive for industry to maintain an active exploration program. In addition, *the Government of Canada will introduce legislation giving the appropriate Minister the right to require companies holding rights to such structures to have exploratory drilling undertaken within a reasonable time period.* The legislation will contain appropriate safeguards for the companies concerned as well as appeal procedures. It will also contain appropriate penalties for those companies that do not comply. It will make it possible to acquire the information that is necessary to plan our energy future in the most beneficial way.

The appropriate development of Canadian coal resources, in terms of national energy objectives, provincial aspirations, and adequate environmen-

tal safeguards, can be properly evaluated only with a thorough knowledge of what resources are available and in what manner they can best be developed and used. The Government of Canada, therefore, places a high priority on early completion of federal-provincial programs contributing towards improvement of the coal inventory of all regions of the country.

### *5. Interfuel substitution*

Beyond the use of market forces to encourage interfuel substitution, there are a number of specific areas where government initiatives may be desirable. These include:

- encouraging the substitution of electricity generated from domestic energy resources, including coal, hydro and nuclear, for electricity generated from imported oil;
- pursuing the potential for supplying natural gas to markets in the Atlantic Provinces and Quebec from either northern or east coast resources;
- encouraging substitution capability in the design of energy conversion systems, for example coal gasification, and multifuel boilers for electricity generation and industrial process heat; and
- facilitating the use of renewable energy sources, such as solar and wind, that may not be initially competitive, including the encouragement and support of approved demonstration projects.

Coal and nuclear power offer important possibilities for interfuel substitution, although the rate at which such substitution can occur will depend on provincial government policies with respect to the manner in which increasing demands for electric power will be met. It is estimated, in both scenarios presented above, that CANDU nuclear power stations built largely of Canadian materials and equipment and fuelled with Canadian uranium, could provide about one third of new electrical generating capacity required by 1990. Nuclear capacity would increase by about 20 000 megawatts (MW) in the high-price scenario and about 27 000 MW in the low-price scenario.

The federal government is supporting interfuel substitution through such initiatives as financial assistance for the Point Lepreau nuclear station in New Brunswick and an offer to assist in the further development of the Lower Churchill River in Newfoundland. Further measures which may be appropriate and desirable in these areas are under active consideration. Such specific measures must be evaluated on the basis of the additional costs they impose in relation to the degree to which they are effective in promoting the overall objective of our energy strategy. Their implementation will require federal-provincial consultation and cooperation.

## 6. *New delivery systems*

The extension of the Interprovincial Pipe Line system to Montreal is nearing completion and western Canadian oil is expected to begin flowing to the Montreal market in the spring of 1976. As the demand for oil in eastern Canada increases and the availability of Canadian supplies diminishes it may become necessary to reverse the flow in this pipeline to deliver oil to Ontario markets. It may, as well, become necessary to increase our capability to deliver oil, possibly Canadian oil from the eastern Arctic or the East Coast offshore, to Montreal and Ontario, through a further extension of the Canadian pipeline system to the east coast.

The scenarios developed and discussed indicate that the prospect of supplies of natural gas from Canada's frontier areas offers substantial potential for alleviating Canadian energy supply/demand difficulties and facilitating the reduced dependence on imported oil through the next fifteen years. At the same time, however, the costs, including the social and environmental costs, associated with as rapid a development as possible of northern resources are not yet adequately known. The Government of Canada is not committed to the delivery of frontier gas at any cost. The reports to be submitted by the Berger Commission and the National Energy Board will provide information necessary to assess the options available. On the basis of this information the federal government will determine the timing and means by which northern resources may be developed to best serve the national interest.

In order to be prepared for the possibility of natural gas shortfalls, and to provide for the equitable distribution of supplies should they not be adequate to meet Canadian demands and current contractual export commitments, the Government of Canada will introduce amendments to the National Energy Board Act. These amendments will facilitate the allocation of domestic natural gas supplies among consuming provinces in the event of shortages. In addition, consultations with U.S. officials will be pursued to determine the manner in which such shortages, should they occur, would be shared between domestic and export customers.

The Government of Canada will continue its policy of funding 50% of approved studies of interprovincial and interregional electrical interconnections, and financing up to 50% of the capital cost of approved projects. In view of the objective of minimizing Canadian dependence on imported oil, the federal government believes that the development of regional electrical interconnections, particularly in eastern Canada, should be accelerated.

It is also apparent that it is necessary to improve the transportation systems for eastward movement of western Canadian coal, and that proposed delivery systems be efficient and competitive. Improved delivery systems will depend, to a large degree, on the conclusion of contractual arrangements

between Canadian producers and consumers of coal. *The federal government therefore has taken the position that, before new export commitments for coal are undertaken, efforts should be made by the producers to determine whether a market exists in Canada for the additional coal production.*

### *7. Emergency preparedness*

In planning our energy future for the next ten to fifteen years we must ensure that Canadians are protected against interruptions in imported oil supplies. Canada is now guaranteed a significant amount of protection against selective embargoes or general supply curtailments through storage facilities, standby production in western Canada, an emergency allocation program developed by the Energy Supplies Allocation Board, and participation in the emergency sharing scheme of the International Energy Agency. It is apparent, however, that Canada's relatively favourable position will be eroded as our standby production is used up and our net imports continue to increase. The federal government has a number of projects under consideration and discussion with the provincial governments, including below-ground storage of oil in facilities such as the Wabana iron mine in Newfoundland, which could hold about 100 million barrels of oil.

### *8. Increased research and development*

Science and technology have a multiple role to play in a national strategy: in developing new energy systems, improving existing ones and in limiting the demand for energy. Perhaps most significant of all the contributions of science and technology to a national strategy is the potential offered for providing new energy options in the future.

High priority must be given to research and development which will increase supplies of oil and gas, including enhanced recovery from known oil and gas fields, in situ recovery methods from the oil sands, and the development of new technology for the frontier regions. For the immediate future, the decline of coal as a major source of energy must be reversed. To accomplish this, new approaches to mining, protecting the environment and transporting and utilizing coal are required. The gasification of coal on a commercial scale will only be fully realized if preceded by an adequate program of research, development and demonstration. In the longer-term search for new energy options, the promise of power from nuclear fusion should not be neglected and the feasibility of using renewable resources (represented by solar, wind, tidal, geothermal and biomass) should be fully explored, as these are all areas where the application of science and technology has great potential. It is recognized that these energy sources will make a major contribution only over the longer term, and their impact will not be substantial

in the next ten or fifteen years. Nevertheless, we must use this time to develop a coordinated program, which will assess all contending forms of renewable energy and fully develop the most promising and economically feasible forms for future application.

In fiscal year 1975-76, federal expenditures for energy research and development amounted to about \$113 million, three quarters of which was devoted to the nuclear field. The remainder was widely distributed through different departments and agencies on the many other facets of energy. Although the funds for nuclear research and development are clearly justifiable and essential for a program of the magnitude of CANDU, the potential offered by research and development on other energy forms will not be realized until these are fully funded. The Government of Canada has designated six major priority areas to be emphasized in incremental funding decisions over the next few years and has approved limited additional funding for fiscal year 1976-77, as part of a policy of incremental support over the next five years. The priority areas designated are conservation, oil and gas, coal, nuclear (including uranium resources), renewable energy sources, and transportation and transmission systems, which would receive a priority corresponding to the form of primary energy involved.

### *9. Greater Canadian content and participation*

The federal government is committed to greater Canadian content and participation in resource development. The Foreign Investment Review Agency will have the responsibility of determining that future screenable foreign investments are of significant benefit to Canada. This policy element will also be reinforced by:

- legislation concerning Canadian oil and gas land regulations to be introduced to Parliament shortly which will facilitate greater Canadian participation in exploration and development on Canada Lands;
- the entry of Petro-Canada into exploration and development;
- uranium ownership policy, under which foreign participation in new uranium developments is limited to 33%;
- guidelines with regard to Canadian content in resource-related activities on Canada Lands, particularly with respect to engineering and project management at the development stage.

## Conclusion

Our energy problems are complex. We have reached a point where the structure of our energy system is changing in ways that will deeply affect present and future generations of Canadians.

There is no single solution. We must strive to reduce our energy requirements to the minimum necessary to support the quality of life we desire. We must accelerate the search for new sources of energy and for new technologies for the production, distribution, conversion and utilization of energy. We must intensify our efforts to maintain control of our energy future, by minimizing our dependence on sources of supply that are not secure. And, mindful of the social, environmental and economic aspirations of all Canadians, we must pursue these aims in a manner that makes the necessary adjustments as smooth and orderly as possible.

This is the challenge. It is a tough challenge, but we believe the strategy we have set forth will meet it positively and effectively. It is a strategy directed towards self-reliance, both short-to-medium and long term. Further policy initiatives—directed at the problems of transition from oil- and gas-based energy systems to alternative energy sources including solar, wind and tidal power—will be required to prepare for the longer-term future. However, for both the short-to-medium and the longer term, the next ten years are critical.

With the constructive cooperation of provincial governments, and with the support of Canadians in all regions of the country, Canada can achieve the objective of energy self-reliance. Success in this endeavour will increase both the confidence and the options with which we can plan for the years beyond 1985.





